UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

OFFICE OF
ENVIRONMENTAL CLEANUP

April 6, 2016

Jennifer Roberts, Manager
DEC Contaminated Sites Program
555 Cordova Street
Anchorage, AK 99501

Re: Fourth Avenue and Gambell Parking Lot Site
EPA Site # AKN001002925

In a December 23, 2014 letter to the U.S. Environmental Protection Agency (EPA), the Alaska Department of Environmental Conservation (DEC) indicated it would use state authority to manage characterization and/or cleanup of the Fourth Avenue and Gambell Parking Lot Site (Site) and requested to remain the lead for this Site and designate it as an Other Cleanup Authority – State Lead (OCA) site.

Since DEC's request, EPA has conducted a management review of the Site and determined that designating this Site as OCA would be appropriate at this time. However, during review of the Site there were concerns regarding who would provide oversight of monitoring, maintenance, and repair (MM&R) for the VI mitigation systems installed at the affected residences as a part of the EPA removal action conducted in the Fall of 2014. EPA is providing the information herein to address those concerns:

On January 9, 2014, DEC finished reviewing the Action Memorandum for Subarea II of the Fourth Avenue and Gambell Street Site and provided assurance to EPA that "ADEC agrees to provide oversight of post-removal site control activities to ensure the protectiveness of the removal action. ADEC will also ensure that institutional controls are implemented to minimize the potential for human exposure to contamination." A copy of this email is enclosed. DEC also made an entry on its Site Report online at http://dec.alaska.gov/Applications/SPAR/PublicMVC/CSP/SiteReport/4084 on January 8, 2014 with an update reflecting the same agreement to take on oversight and institutional control responsibilities.

Based on DEC's assurances, on January 17, 2014, EPA issued the final Action Memorandum, stating on page 8: "ADEC will provide oversight of implementation of a maintenance, monitoring, and repair (MM&R) plan managed by the property owners, and will ensure that institutional controls are implemented to minimize the potential for human exposure to contamination by limiting resource use."

It is EPA's understanding that DEC will provide oversight of the homeowner implementation of the MM&R plans. If you believe this is not the case, please submit a written reply to this letter within 10 calendar days of your receipt of this letter, and include DEC's rationale. A copy of the

MM&R plans for each of the four residences, which outlines the required maintenance, monitoring, and repair of the VI mitigation systems, is enclosed.

Additionally, the preliminary hazard ranking system score for the Site is greater than 28.5. This preliminary score was generated using the information gathered during the SI and therefore this Site will be considered "excluded" as an eligible response site (ERS) under the statute [CERCLA § 101(41)(C)(i)]. Once excluded, the Site may be addressed by other clean-up authorities; however, EPA preserves its enforcement and cost recovery authorities, and the Site is still eligible for listing on the National Priorities List (NPL). If you are interested in further details of this statute, please refer to OSWER Directive 9230-0-107.

If you believe this Site should not be considered "excluded" as an eligible response site, please submit a written reply to this letter within 10 calendar days of your receipt of this letter, and include the rationale for your determination.

EPA will continue to track this Site and will request annual updates from DEC on its progress. Should new or additional information become available which indicates a need for further investigation under the EPA Superfund Program, the Site may be re-evaluated.

If you have questions or need additional information, please do not hesitate to contact me at (206) 553-6911.

Sincerely,

Judith Leckrone Lee, Manager
Site Assessment and Brownfields Unit

Enclosures:

E-mail from Grant Lidren, ADEC, to Earl Liverman, EPA. Re: Draft Action Memorandum for the Fourth Avenue & Gambell Street Site. 9 January 2014.

Fourth and Gambell Site Vapor Mitigation Systems Monitoring, Maintenance, and Repair Plans. January 13, 2015.

cc:

Site File
Grant Lidren, ADEC

Liverman, Earl

From: Lidren, Grant M (DEC) [grant.lidren@alaska.gov]
Sent: Thursday, January 09, 2014 2:08 PM
To: Liverman, Earl
Cc: Whittier, Robert; Cole, Kelly; Steven G. Hall; Bainbridge, Steven T (DEC); Janes, William B (DEC); Nuechterlein, Linda K (DEC); McLoone, Keather A (DEC)
Subject: RE: Draft Action Memorandum for the Fourth Avenue & Gambell Street Site

Earl, ADEC has no objections to the Draft Action Memorandum for the Fourth Avenue & Gambell Street Site. ADEC agrees to provide oversight of post-removal site control activities to ensure the protectiveness of the removal action. ADEC will also ensure that institutional controls are implemented to minimize the potential for human exposure to contamination.

Thanks, Grant

Grant Lidren
Environmental Program Specialist
Alaska Department of Environmental Conservation
Contaminated Sites Program
(907) 269-8685

From: Liverman, Earl [mailto:Liverman.Earl@epa.gov]
Sent: Friday, December 20, 2013 8:50 AM
To: Lidren, Grant M (DEC)
Cc: Whittier, Robert; Cole, Kelly; Steven G. Hall
Subject: Draft Action Memorandum for the Fourth Avenue & Gambell Street Site

Hello,

Attached is the above-referenced draft action memorandum and supporting figures. Please review the document and provide any comments, preferably no later than Monday, December 30th. The best way to contact me during the holidays is via email; feel free to do so with any questions or concerns you may have about the document.

Thank you and best wishes for you and yours during the holidays.

Earl Liverman
Federal On-Scene Coordinator
US EPA Coeur d'Alene Field Office
1910 Northwest Boulevard, Suite 208
Coeur d'Alene, Idaho 83815
T - 208.664.4858; F - 208.664.5829
C - 208.651.8709

FOURTH AND GAMBELL SITE

VAPOR MITIGATION SYSTEMS MONITORING, MAINTENANCE, AND REPAIR PLANS

710 EAST THIRD AVENUE
720 EAST THIRD AVENUE
736 EAST THIRD AVENUE – NORTH DUPLEX
736 EAST THIRD AVENUE – SOUTH DUPLEX

JANUARY 13, 2015

Prepared By:

Ahtna Engineering Services, LLC
110 West 38th Avenue, Suite 200A
Anchorage, Alaska 99503

and

ResCon Alaska, LLC
1120 Huffman Road, Suite 24-431
Anchorage, Alaska 99515

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VAPOR MITIGATION SYSTEM MONITORING, MAINTENANCE, AND REPAIR PLAN

710 EAST THIRD AVENUE

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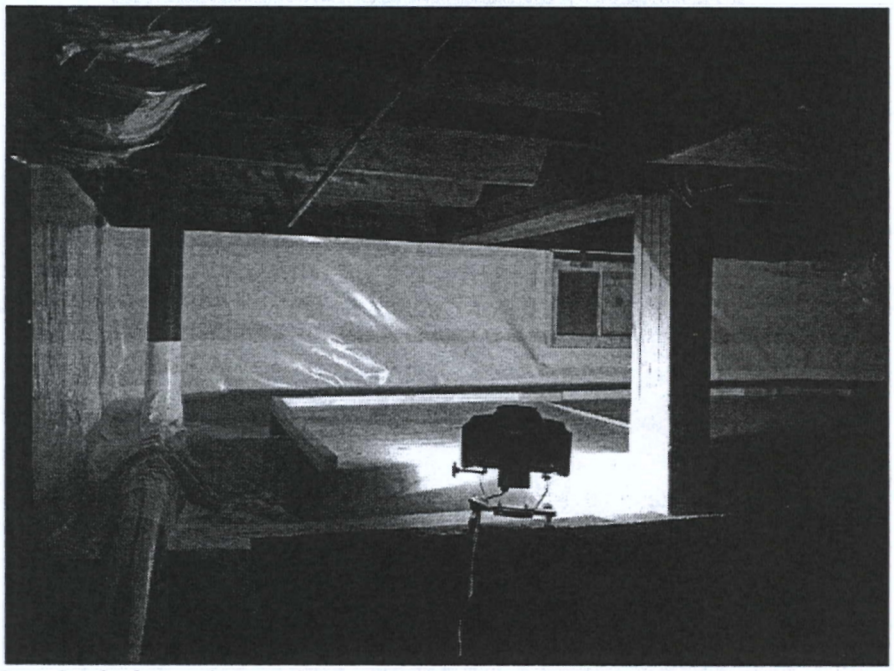
710 EAST THIRD AVENUE VAPOR MITIGATION SYSTEM

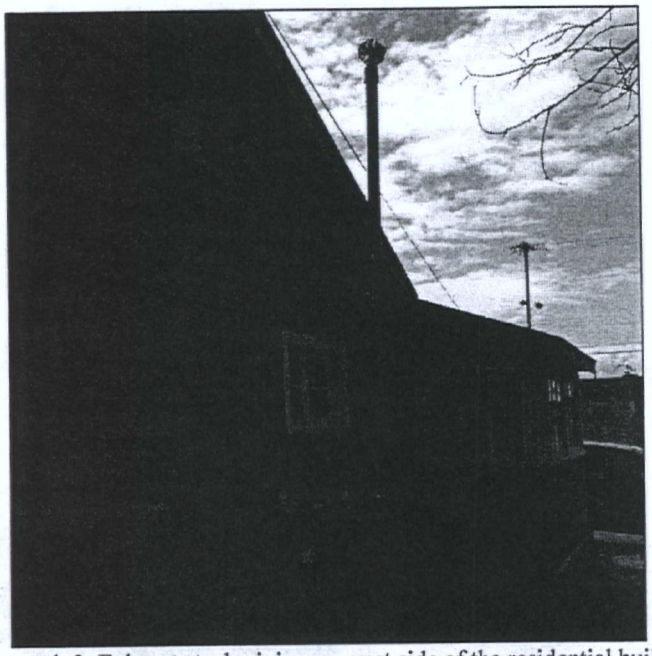
The vapor mitigation system at 710 East 3rd Avenue is a passive system consisting of plastic vapor barrier in the crawlspace areas installed over perforated vent piping. Additionally, three 2-inch diameter sub-slab vapor wells are installed through the floor of the basement area. The perforated piping and the vapor wells are connected to 4-inch diameter conveyance piping that leads to exhaust stacks on the east and west side of the structure. A site diagram of the system is shown at the end of this plan.

The vapor barrier is secured to the concrete walls of the crawlspace using a vapor barrier tape and plastic anchor plugs and is designed to seal the structure off from the contaminant vapors in the soil. The perforated piping was installed beneath the vapor barrier in the crawlspaces to remove accumulated volatile contaminants that build up beneath the barrier as shown in Photograph 1.



Photograph 1: Vapor barrier in crawlspace with wooden framing over the plastic barrier and the perforated piping to enable storage in the crawlspace area.

Wind-driven ventilation fans were installed on top of the exhaust stacks to draw the contaminant vapors into the depressurization lines as shown in Photograph 2.



Photograph 2: Exhaust stack piping on west side of the residential building.

Quarterly Inspection

The system should be inspected quarterly by the property owner/facility manager (or environmental contractor) for indications of damage to the vapor barriers, the indoor piping or exhaust stacks. The quarterly monitoring should include:

- Inspection of the vapor barrier for tears or holes or indications that the barrier is peeling away from the concrete walls.
- Inspection of the vapor barrier for puddles that could form on top of the liner material from leaks to the home water or drain line piping. Standing water can overtime breakdown the vapor barrier tape along the liner seams, thereby opening up an entry point for contaminant vapors into the building.
- Inspection of the exhaust stacks and ventilation fans on the exterior of the structure for any indications of damage. Verify that the wind turbines are spinning during windy conditions. Note any growling or rattling noise coming from the turbines.

If any damage to the vapor barriers, the indoor piping, or the exhaust stacks are observed during the quarterly inspection, an environmental contractor should be contracted to make needed repairs to ensure the long-term protectiveness and durability of the vapor intrusion systems.

Biannual Maintenance

At the base of the exhaust stacks on each side of the building is a drain plug installed to drain condensate or precipitation that accumulates in the piping. The following biannual maintenance

should be performed by the property owner/facility manager (or environmental contractor) to maintain the system:

- Open the drain valves at the base of the exhaust stack twice a year in the spring and fall during non-freezing temperatures to remove any condensation or precipitation from the exhaust piping.

Care

The property owner/facility manager must avoid disturbance to the vapor barrier liners, the indoor piping, and the exhaust stacks. In particular, the property owner/facility manager must:

- Avoid placing heavy and/or sharp objects on the liner.
- Repair all water and drain line leaks in a timely manner, cleaning up any standing water on the liner created by the leaks.
- Avoid accessing the crawlspace with the exception of performing system monitoring events and/or repairs.

Sampling Every Two Years

It is recommended that indoor air sampling for contaminants of concern be performed every two years by an environmental contractor to ensure continued successful operation of the vapor intrusion mitigation system.

The following sampling and analysis plan should be provided to an environmental contractor to ensure the collection of representative indoor air samples.

Analytical Program

The indoor air sample should be collected in a 100%-certified, 6-liter stainless steel Summa canister and analyzed by Environmental Protection Agency method TO-15 for tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cDCE), trans-1,2-dichloroethene (tDCE), 1,2-dichloroethene (1,1-DCE) and vinyl chloride. The sample should be collected over a 24-hour indoor period using a flow controller. The analysis of the sample should be performed by a laboratory that is part of the National Environmental Laboratory Accreditation Program.

Sample Locations

The indoor air sample should be collected from the basement of the building in a centrally located area that has minimal influence from features with increased air exchange (e.g., near an exterior door or window). The sample should be collected from the location shown on the attached figure (in the utility room).

Sample Collection

The following actions should be performed prior to sampling:

1. Minimize sampling error by avoiding actions that could cause sample interference such as: fueling vehicles, using permanent ink marking pens, or wearing perfume or cologne in vicinity of the samples.
2. Measure the initial vacuum of the canister. Any canister containing an initial vacuum of less than 25 inches of mercury (in. Hg) will not be utilized and will be replaced during the sampling event.
3. Perform a leak detection test if the canister and flow controller by capping the inlet of the flow controller and opening the canister valve a half-turn and then closing the canister valve.
4. Verify for one minute that the canister and flow controller holds vacuum.
5. If the canister and flow controller do not hold vacuum, then refit or tighten connections and repeat leak detection test.
6. After a successful leak detection test, uncap the inlet of flow controller, open the canister valve a half-turn, and begin the sample collection period.
7. Record the start time, date, initial vacuum, regulator serial number and canister ID on the canister tag, the field notes and the laboratory chain of custody form.
8. Monitor sample progress periodically.
9. At the completion of the 24-hour sampling period, close the valve on the canister, hand-tight.
10. The canisters should be retrieved prior to being completely filled to enable comparison of the residual vacuum level at the end of the sample collection with the vacuum measured upon receipt to the lab for quality control purposes.
11. Record the final vacuum on the canister tag, field notes and chain of custody form.
12. Submit the samples to the analytical laboratory in accordance with chain of custody procedures.

Data Quality

Laboratory data should be reviewed using ADEC's *Laboratory Data Review Checklist for Air Samples.*

Data Evaluation

Analytical results should be compared to the ADEC Target Levels for Residential Indoor Air as listed in the ADEC Vapor Intrusion Guidance for Contaminated Sites. As of December 2014, the indoor air target levels are:

ADEC TARGET LEVELS FOR RESIDENTIAL INDOOR AIR

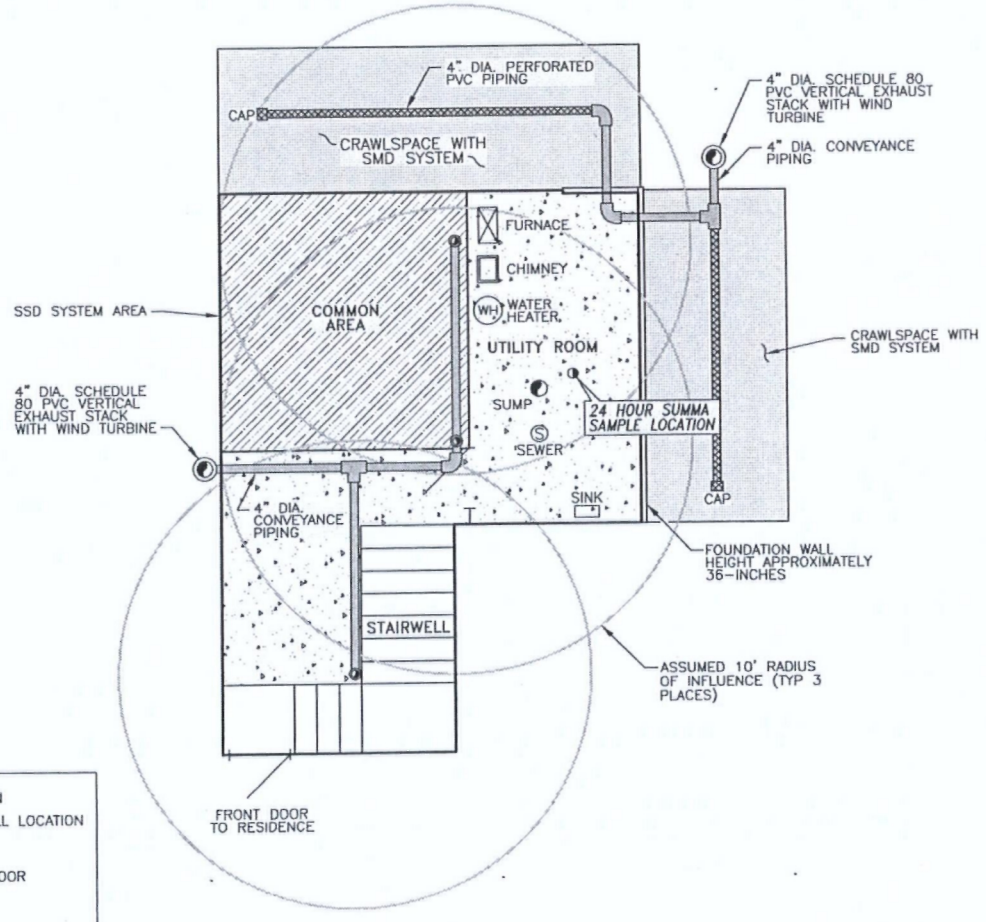
Contaminant	Cleanup Level ($\mu g/m^3$)
PCE	42
TCE	2.0
cDCE	7.3
tDCE	63
1,1-DCE	210
VC	1.6

Key:
$\mu g/m^3$ = micrograms per cubic meter

For More Information

For more information or questions regarding vapor intrusion or the maintenance and repair of vapor intrusion systems contact the Alaska Department of Environmental Conservation.

Department of Environmental Conservation
Division of Spill Prevention and Response
Contaminated Sites Program
555 Cordova Street
Anchorage, AK 99501
(907) 269-7503



LEGEND

- INDOOR AIR SAMPLE LOCATION
- 2" DIAMETER EXTRACTION WELL LOCATION
- VAPOR BARRIER ON SOIL
- AREA WITH WOOD FRAMED FLOOR OVER SOIL
- CONCRETE SLAB
- PERFORATED PVC PIPE
- CONVEYANCE PIPE

NOTE:
VAPOR BARRIER EXTENDS TO TOP OF FOUNDATION WALLS AROUND BUILDING PERIMETER.

N

0 2.5 5

APPROX. SCALE IN FEET

FIGURE 3

710 E. 3rd AVENUE - AS-BUILT

VAPOR INTRUSION MITIGATION INSTALLATION REPORT
EPA EMERGENCY AND RAPID RESPONSE SERVICES
4TH AND GAMBELL SITE
Anchorage, Alaska

Ahtna Engineering

DATE: JANUARY 2015
REV.: -
CHKD: N.P.O.
DRAWN: C.E.H.
PROJ. No.: 15-001

PATH: D:\Project Drawings\2014 Drawings\14 Gambell\14 GAM VIM RPT FILE: 14-GAM-VIM-RPT-F3.DWG PLOTTED: 1/12/15.

FOURTH AND GAMBELL SITE

VAPOR MITIGATION SYSTEM MONITORING, MAINTENANCE, AND REPAIR PLAN

720 EAST THIRD AVENUE

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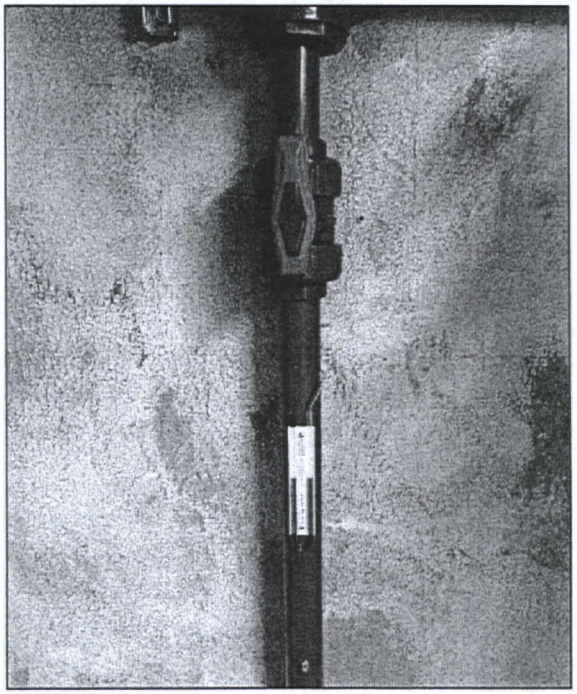
720 EAST THIRD AVENUE VAPOR MITIGATION SYSTEM

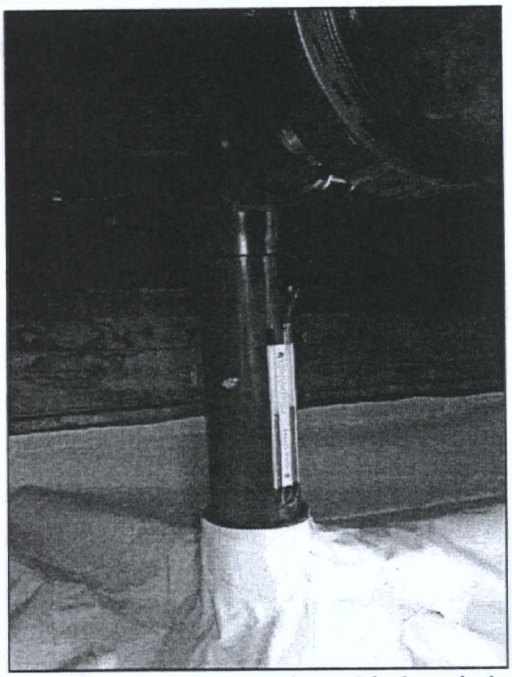
The vapor intrusion mitigation system at 720 East 3rd Avenue is an active system with energized exhaust fans to remove contaminant vapors in the crawlspace and beneath the building. The system consists of plastic vapor barrier in the crawlspace beneath the stairs that covers perforated vent piping. The vapor barrier is secured to the concrete walls of the crawlspace using a vapor barrier tape to seal the structure off from the contaminant vapors in the soil. A 2-inch diameter depressurization well is also installed through the wood storage area on the west side of the stairwell. Three, 2-inch diameter sub-slab vapor wells are installed through the concrete slab in the basement area as shown in Photograph 1.



Photograph 1: One of three 2-inch diameter sub-slab vapor wells in the basement of the building.

The perforated piping and the vapor wells are connected to 4-inch diameter conveyance piping that leads to exhaust stacks on the east and west side of the structure. A diagram of the system is shown at the end of this plan.

A radon style inline exhaust fan was installed on each exhaust pipe to draw contaminant vapors into the mitigation system lines and exhaust them outside the building. Analog manometers were installed on each vertical piping for monitoring the vacuum level at each location, as shown in Photograph 2.



Photograph 2: The U-shaped manometer mounted on a 4-inch vertical pipe in the crawlspace area.

One sub-slab vapor monitoring point was installed through the foundation slab in the basement hallway. The vapor monitoring point is covered by a rug and located near the wall.

Owner Responsibilities

1. Quarterly Inspection

The system should be inspected quarterly by the property owner/facility manager (or environmental contractor) for indications of damage to the vapor barriers, the indoor piping or exhaust stacks, and to verify that the systems maintain a vacuum beneath the vapor barrier in the crawlspace and concrete slab in the basement. The quarterly monitoring should include:

- Inspection of the vapor barrier for tears or holes or indications that the barrier is peeling away from the concrete walls.
- Inspection of the vapor barrier for puddles that could form on top of the liner material from leaks to the home water or drain line piping. Standing water can overtime breakdown the vapor barrier tape along the liner seams, thereby opening up an entry point for contaminant vapors into the building.
- Inspection of the exhaust stacks and ventilation fans on the exterior of the structure for any indications of damage. Verify that the wind turbines are spinning during windy conditions. Note any growling or rattling noise coming from the turbines.
- The analog manometers mounted on the exterior of each vertical pipe (see Photograph below) are U-shaped graduated tubes filled with red indicator oil. The manometers measure the vacuum that is being drawn by operation of the exhaust

fans. One side of the U-tube is connected via flexible tubing to a hole in the vertical pipes. The height of the red oil on the right-hand side of the graduated U-tube measures level of vacuum being drawn on the system in inches of water column (inWC). Any reading above 0 inWC indicates that vacuum is being drawn through the line and the system is working. **If the red oil on the right side of the manometer drops to zero, the owner should contact the designated environmental contractor to investigate the failure of the system.**

Photograph 3: The U-shaped manometer with the right side red oil shown above zero (proper working condition).

2. Biannual Maintenance

At the base of the exhaust stacks on each side of the building is a drain plug installed to drain condensate or precipitation that accumulates in the piping. The following biannual maintenance should be performed to maintain the system:

- Open the drain valves at the base of the exhaust stack twice a year in the spring and fall during non-freezing conditions to remove any condensation or precipitation from the exhaust piping.

3. Care

The following measures should be taken to minimize disturbance to the vapor barrier liner in the crawlspace and the above ground piping sections.

- Avoid placing heavy and/or sharp objects on the liner.
- Repair all water and drain line leaks over the vapor barrier in a timely manner, cleaning up any standing water on the plastic liner created by the leaks.
- Avoid accessing the crawlspace with the exception of performing system monitoring events and/or repairs.
- Minimize disturbance to the above ground piping.

Environmental Contractor Responsibilities

It is recommended that biannual monitoring by a designated environmental contractor be performed to ensure sustained and optimal operation of the mitigation system. The biannual

monitoring events should be conducted in the winter and summer to evaluate the effects on the system caused by temporal and seasonal variations.

1. Monitoring

A 'Vapor Mitigation System Data Sheet' for system monitoring is attached to this plan to record operation and maintenance (O&M) data. The contractor should complete the form during each biannual monitoring event as described below.

- Air Velocity Measurements: A plugged sample port for measuring air velocity was installed on each vertical riser pipe adjacent to the analog manometers. The contractor should record the air velocity in each line on the O&M form using a handheld anemometer.
- Vacuum Measurements: The contractor should record the vacuum reading from each of the analog manometers.
- Sub-Slab Vacuum Measurements: The contractor should measure the vacuum from the sub-slab vapor monitoring point on the floor of the basement hallway using a digital manometer. All measurements should be documented on the O&M form.
- System Optimization: Ball valves were installed on each of the vertical riser pipes. The valves were installed to control the airflow through each line and to balance the airflow between the lines. Following collection of the initial velocity measurements in each of the lines, the contractor should calculate the airflow in the lines to determine if any adjustment is necessary to the valves. If the valve positions are changed, the specific changes along with a second set of velocity and vacuum readings (Final) should be taken and documented on the O&M form.

2. Maintenance

In the event of the failure of one or both of the in-line fans, the environmental contractor should perform the following troubleshooting procedures:

1. Check for System Power Failure: Power is provided for the operation of the inline fans from a hard-wired connection to the breaker panel in the house. A switch for each individual fan is also installed adjacent to the fan location. The contractor should ensure that both the circuit breaker and the blower power switch are in the 'ON' position.
2. Blockage in Exhaust Pipe: If the fan is energized, but the manometer(s) still reads zero, the cause is likely a blockage in the conveyance or exhaust stack piping. If this occurs in the winter, the blockage may be due to snow or ice buildup in the exhaust stack. Blockages caused by ice will likely be temporary and do not need to be removed to avoid damaging the exhaust piping. If loss of vacuum occurs during warm periods of the year, it is likely that some other obstruction (debris, animal nesting, etc) is creating the blockage. A lower than average (or decreasing) reading in the manometer may be an indication that a blockage is forming in the exhaust pipe. To investigate a blockage, the contractor should inspect the exhaust piping outside the building to see if it can be identified and removed.

3. Fan Removal: If the above two troubleshooting procedures do not correct the problem, remove the fan from the exhaust stack for further inspection. Remove the insulation sections above and below the fan. Loosen the rubber collars around the fan fittings and remove the fan. Inspect the fan for blockage and/or electrical failure. Repair or replace the unit as necessary.

3. Sampling Every Two Years

It is recommended that indoor air sampling for contaminants of concern be performed every two years by an environmental contractor to ensure continued successful operation of the vapor intrusion mitigation system.

The following sampling and analysis plan should be provided to an environmental contractor to ensure the collection of representative indoor air samples.

Analytical Program

The indoor air sample should be collected in a 100%-certified, 6-liter stainless steel Summa canister and analyzed by Environmental Protection Agency method TO-15 for tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cDCE), trans-1,2-dichloroethene (tDCE), 1,2-dichloroethene (1,1-DCE) and vinyl chloride. The sample should be collected over a 24-hour indoor period using a flow controller. The analysis of the sample should be performed by a laboratory that is part of the National Environmental Laboratory Accreditation Program.

Sample Locations

The indoor air sample should be collected from the basement of the building in a centrally located area that has minimal influence from features with increased air exchange (e.g., near an exterior door or window). The sample should be collected from the location shown on the attached figure (in the tool room).

Sample Collection

The following actions should be performed prior to sampling:

1. Minimize sampling error by avoiding actions that could cause sample interference such as: fueling vehicles, using permanent ink marking pens, or wearing perfume or cologne in vicinity of the samples.
2. Measure the initial vacuum of the canister. Any canister containing an initial vacuum of less than 25 inches of mercury (in. Hg) will not be utilized and will be replaced during the sampling event.
3. Perform a leak detection test if the canister and flow controller by capping the inlet of the flow controller and opening the canister valve a half-turn and then closing the canister valve.
4. Verify for one minute that the canister and flow controller holds vacuum.
5. If the canister and flow controller do not hold vacuum, then refit or tighten connections and repeat leak detection test.

6. After a successful leak detection test, uncap the inlet of flow controller, open the canister valve a half-turn, and begin the sample collection period.
7. Record the start time, date, initial vacuum, regulator serial number and canister ID on the canister tag, the field notes and the laboratory chain of custody form.
8. Monitor sample progress periodically.
9. At the completion of the 24-hour sampling period, close the valve on the canister, hand-tight.
10. The canisters should be retrieved prior to being completely filled to enable comparison of the residual vacuum level at the end of the sample collection with the vacuum measured upon receipt to the lab for quality control purposes.
11. Record the final vacuum on the canister tag, field notes and chain of custody form.
12. Submit the samples to the analytical laboratory in accordance with chain of custody procedures.

Data Quality

Laboratory data should be reviewed using ADEC's *Laboratory Data Review Checklist for Air Samples*.

Data Evaluation

Analytical results should be compared to the ADEC Target Levels for Residential Indoor Air as listed in the ADEC Vapor Intrusion Guidance for Contaminated Sites. As of December 2014, the indoor air target levels are:

ADEC TARGET LEVELS FOR RESIDENTIAL INDOOR AIR

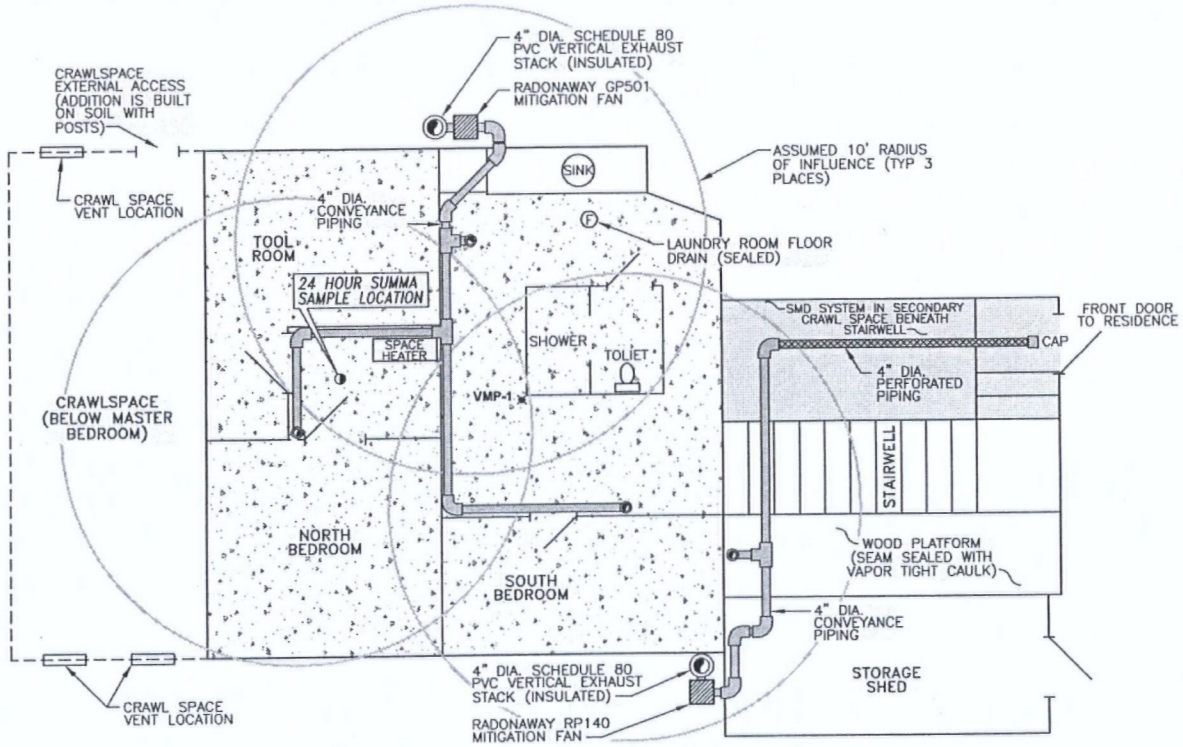
Contaminant	Cleanup Level ($\mu g/m^3$)
PCE	42
TCE	2.0
cDCE	7.3
tDCE	63
1,1-DCE	210
VC	1.6

Key:
$\mu g/m^3$ = micrograms per cubic meter

For More Information

For more information or questions regarding vapor intrusion or the maintenance and repair of vapor intrusion systems contact the Alaska Department of Environmental Conservation.

Department of Environmental Conservation
Division of Spill Prevention and Response
Contaminated Sites Program
555 Cordova Street
Anchorage, AK 99501
(907) 269-7503



LEGEND

- VMP-1 ✕ VAPOR MONITORING POINT LOCATION
- ◑ INDOOR AIR SAMPLE LOCATION
- ◉ 2" DIAMETER EXTRACTION WELL LOCATION
- VAPOR BARRIER ON SOIL
- CONCRETE SLAB WITH SSD SYSTEM
- PERFORATED PVC PIPE
- CONVEYANCE PIPE

N

0 2.5 5

APPROX. SCALE IN FEET

FIGURE 4

720 E. 3rd AVENUE - AS-BUILT

VAPOR INTRUSION MITIGATION INSTALLATION REPORT
EPA EMERGENCY AND RAPID RESPONSE SERVICES
4TH AND GAMBELL SITE
Anchorage, Alaska

Ahtna Engineering

DATE: JANUARY 2015
REV.: –
CHKD: N.P.O.
DRAWN: C.E.H.
PROJ. No.: 15-001

PATH: D:\Project Drawings\2014 Drawings\14 Gambell\14 CAM VIM RPT FILE: 14-CAM-VIM-RPT-F4.DWG PLOTTED: 1/12/15.

FOURTH AND GAMBELL SITE

VAPOR MITIGATION SYSTEM MONITORING, MAINTENANCE, AND REPAIR PLAN

736 EAST THIRD AVENUE – NORTH DUPLEX

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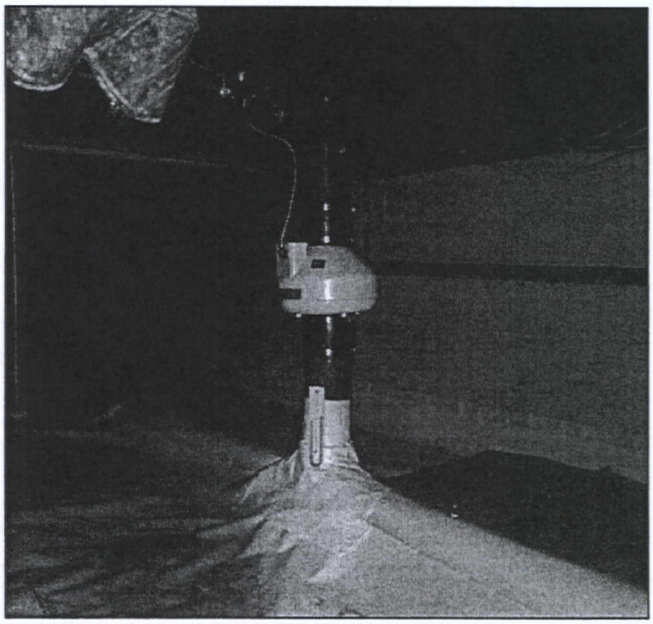
NORTH DUPLEX VAPOR MITIGATION SYSTEM

The vapor mitigation system in the 736 East 3rd Avenue – North Duplex is an active system with energized exhaust fans to remove contaminant vapors in the crawlspace and beneath the concrete basement slab.

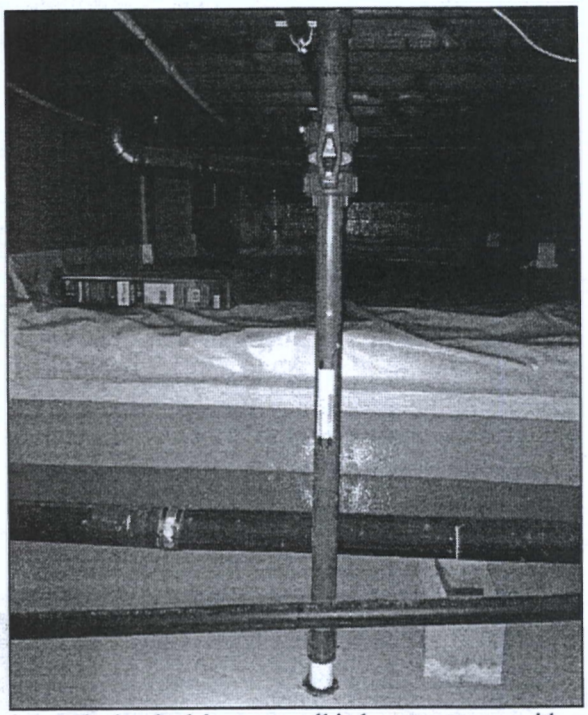
The system consists of vapor barrier that covers perforated vent piping in the crawlspace area and two 2-inch diameter sub-slab vapor wells in the basement area. The perforated piping and the vapor wells are connected to 4-inch diameter conveyance piping that leads to exhaust stacks on the east and west side of the structure. The vapor barrier is secured to the concrete perimeter walls of the crawlspace using a vapor barrier tape to seal the structure off from the contaminant vapors in the soil. The perforated piping was installed beneath the vapor barrier in the crawlspaces to remove contaminants that build up beneath the barrier. A vapor blocking epoxy paint was applied to the remaining portion of the sub-grade area including the basement floor and concrete walls. A diagram of the system is provided at the end of this plan.

A radon style inline exhaust fan was installed on the vertical sections of the 4-inch diameter pipes to draw contaminant vapors into the lines and exhaust them outside the building as shown in Photograph 1 below.



Photograph 1: Exhaust pipe with inline fan along east side of crawlspace area.

Analog manometers were installed on each vertical piping for monitoring the vacuum level at each location as shown in Photograph 2.



Photograph 2: Vertical piping from 2-inch sub-slab vapor well in basement area, with mounted U-shaped analog manometer and flow control valve.

Two sub-slab vapor sampling points were installed through the foundation slab in the basement area. The vapor points were covered by stainless steel caps flush with the concrete slab.

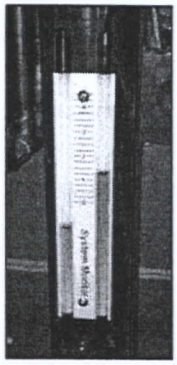
Owner Responsibilities

1. Quarterly Inspection

The system should be inspected quarterly by the property owner/facility manager (or environmental contractor) for indications of damage to the vapor barriers, the indoor piping or exhaust stacks, and to verify that the systems maintain a vacuum beneath the vapor barrier in the crawlspace and concrete slab in the basement. The quarterly monitoring should include:

- Inspection of the vapor barrier for tears or holes or indications that the barrier is peeling away from the concrete walls.
- Inspection of the vapor barrier for puddles that could form on top of the liner material from leaks to the home water or drain line piping. Standing water can overtime breakdown the vapor barrier tape along the liner seams, thereby opening up an entry point for contaminant vapors into the building.

- Inspection of the exhaust stacks and ventilation fans on the exterior of the structure for any indications of damage. Verify that the wind turbines are spinning during windy conditions. Note any growling or rattling noise coming from the turbines.
- The analog manometers mounted on the exterior of each vertical pipe (see Photograph below) are U-shaped graduated tubes filled with red indicator oil. The manometers measure the vacuum that is being drawn by operation of the exhaust fans. One side of the U-tube is connected via flexible tubing to a hole in the vertical pipes. The height of the red oil on the right-hand side of the graduated U-tube measures level of vacuum being drawn on the system in inches of water column (inWC). Any reading above 0 inWC indicates that vacuum is being drawn through the line and the system is working. **If the red oil in the right side of the manometer drops to zero, the owner should contact the designated environmental contractor to investigate the failure of the system.**



Photograph 3: The U-shaped manometer with the right side red oil shown above zero (proper working condition).

2. Biannual Maintenance

At the base of the exhaust stacks on each side of the building is a drain plug installed to drain condensate or precipitation that accumulates in the piping. The following biannual maintenance should be performed to maintain the system:

- Open the drain valves at the base of the exhaust stack twice a year in the spring and fall during non-freezing conditions to remove any condensation or precipitation from the exhaust piping.

3. Care

The following measures should be taken to minimize disturbance to the vapor barrier liner in the crawlspace and the above ground piping sections.

- Avoid placing heavy and/or sharp objects on the liner.
- Repair all water and drain line leaks over the vapor barrier in a timely manner, cleaning up any standing water on the plastic liner created by the leaks.
- Avoid accessing the crawlspace with the exception of performing system monitoring events and/or repairs.

- Minimize disturbance to the above ground piping.

Environmental Contractor Responsibilities

Biannual monitoring of the system by a designated environmental contractor is recommended to ensure sustained and optimal operation of the mitigation system. The biannual monitoring events should be conducted in the winter and summer to evaluate the effects on the system caused by temporal and seasonal variations.

1. Monitoring

A 'Vapor Mitigation System Data Sheet' for system monitoring is attached to this plan to record operation and maintenance (O&M) data. The contractor should complete the form during each biannual monitoring event as described below.

- Air Velocity Measurements: A plugged sample port for measuring air velocity was installed on each vertical riser pipe adjacent to the analog manometers. The contractor should record the air velocity in each line on the O&M form using a handheld anemometer.
- Vacuum Measurements: The contractor should record the vacuum reading from each of the analog manometers.
- Sub-Slab Vacuum Measurements: The contractor should measure the vacuum from the two sub-slab vapor sample points on the floor of the basement using a digital manometer. All measurements should be documented on the O&M form.
- System Optimization: Ball valves were installed on each of the vertical riser pipes. The valves were installed to control the airflow through each line and to balance the airflow between the lines. Following collection of the initial velocity measurements in each of the lines, the contractor should calculate the airflow in the lines to determine if any adjustment is necessary to the valves. If the valve positions are changed, the specific changes along with a second set of velocity and vacuum readings (Final) should be taken and documented on the O&M form.

2. Maintenance

In the event of failure of one or both of the in-line fans, the environmental contractor should perform the following troubleshooting procedures:

1. Check for System Power Failure: Power is provided for the operation of the inline fans from a hard-wired connection to the breaker panel in the house. A switch for each individual fan is also installed adjacent to the fan location. The contractor should ensure that both the circuit breaker and the blower power switch are in the 'ON' position.
2. Blockage in Exhaust Pipe: If the fan is energized, but the manometer(s) still reads zero, the cause is likely a blockage in the conveyance or exhaust stack piping. If this occurs in the winter, the blockage may be due to snow or ice buildup in the exhaust stack. Blockages caused by ice will likely be temporary and do not need to be removed to avoid

damaging the exhaust piping. If loss of vacuum occurs during warm periods of the year, it is likely that some other obstruction (debris, animal nesting, etc) is creating the blockage. A lower than average (or decreasing) reading in the manometer may be an indication that a blockage is forming in the exhaust pipe. To investigate a blockage, the contractor should inspect the exhaust piping outside the building to see if it can be identified and removed.

3. Fan Removal: If the above two troubleshooting procedures do not correct the problem, remove the fan from the conveyance piping for further inspection. Remove the insulation sections above and below the fan. Loosen the rubber collars around the fan fittings and remove the fan. Inspect the fan for blockage and/or electrical failure. Repair or replace the unit as necessary.

3. Sampling Every Two Years

It is recommended that indoor air sampling for contaminants of concern be performed every two years by an environmental contractor to ensure continued successful operation of the vapor intrusion mitigation system.

The following sampling and analysis plan should be provided to an environmental contractor to ensure the collection of representative indoor air samples.

Analytical Program

The indoor air sample should be collected in a 100%-certified, 6-liter stainless steel Summa canister and analyzed by Environmental Protection Agency method TO-15 for tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cDCE), trans-1,2-dichloroethene (tDCE), 1,2-dichloroethene (1,1-DCE) and vinyl chloride. The sample should be collected over a 24-hour indoor period using a flow controller. The analysis of the sample should be performed by a laboratory that is part of the National Environmental Laboratory Accreditation Program.

Sample Locations

The indoor air sample should be collected from the basement of the building in a centrally located area that has minimal influence from features with increased air exchange (e.g., near an exterior door or window). The sample should be collected from the location shown on the attached figure (in the work shop).

Sample Collection

The following actions should be performed prior to sampling:

1. Minimize sampling error by avoiding actions that could cause sample interference such as: fueling vehicles, using permanent ink marking pens, or wearing perfume or cologne in vicinity of the samples.

2. Measure the initial vacuum of the canister. Any canister containing an initial vacuum of less than 25 inches of mercury (in. Hg) will not be utilized and will be replaced during the sampling event.
3. Perform a leak detection test if the canister and flow controller by capping the inlet of the flow controller and opening the canister valve a half-turn and then closing the canister valve.
4. Verify for one minute that the canister and flow controller holds vacuum.
5. If the canister and flow controller do not hold vacuum, then refit or tighten connections and repeat leak detection test.
6. After a successful leak detection test, uncap the inlet of flow controller, open the canister valve a half-turn, and begin the sample collection period.
7. Record the start time, date, initial vacuum, regulator serial number and canister ID on the canister tag, the field notes and the laboratory chain of custody form.
8. Monitor sample progress periodically.
9. At the completion of the 24-hour sampling period, close the valve on the canister, hand-tight.
10. The canisters should be retrieved prior to being completely filled to enable comparison of the residual vacuum level at the end of the sample collection with the vacuum measured upon receipt to the lab for quality control purposes.
11. Record the final vacuum on the canister tag, field notes and chain of custody form.
12. Submit the samples to the analytical laboratory in accordance with chain of custody procedures.

Data Quality

Laboratory data should be reviewed using ADEC's *Laboratory Data Review Checklist for Air Samples*.

Data Evaluation

Analytical results should be compared to the ADEC Target Levels for Residential Indoor Air as listed in the ADEC Vapor Intrusion Guidance for Contaminated Sites. As of December 2014, the indoor air target levels are:

ADEC TARGET LEVELS FOR RESIDENTIAL INDOOR AIR

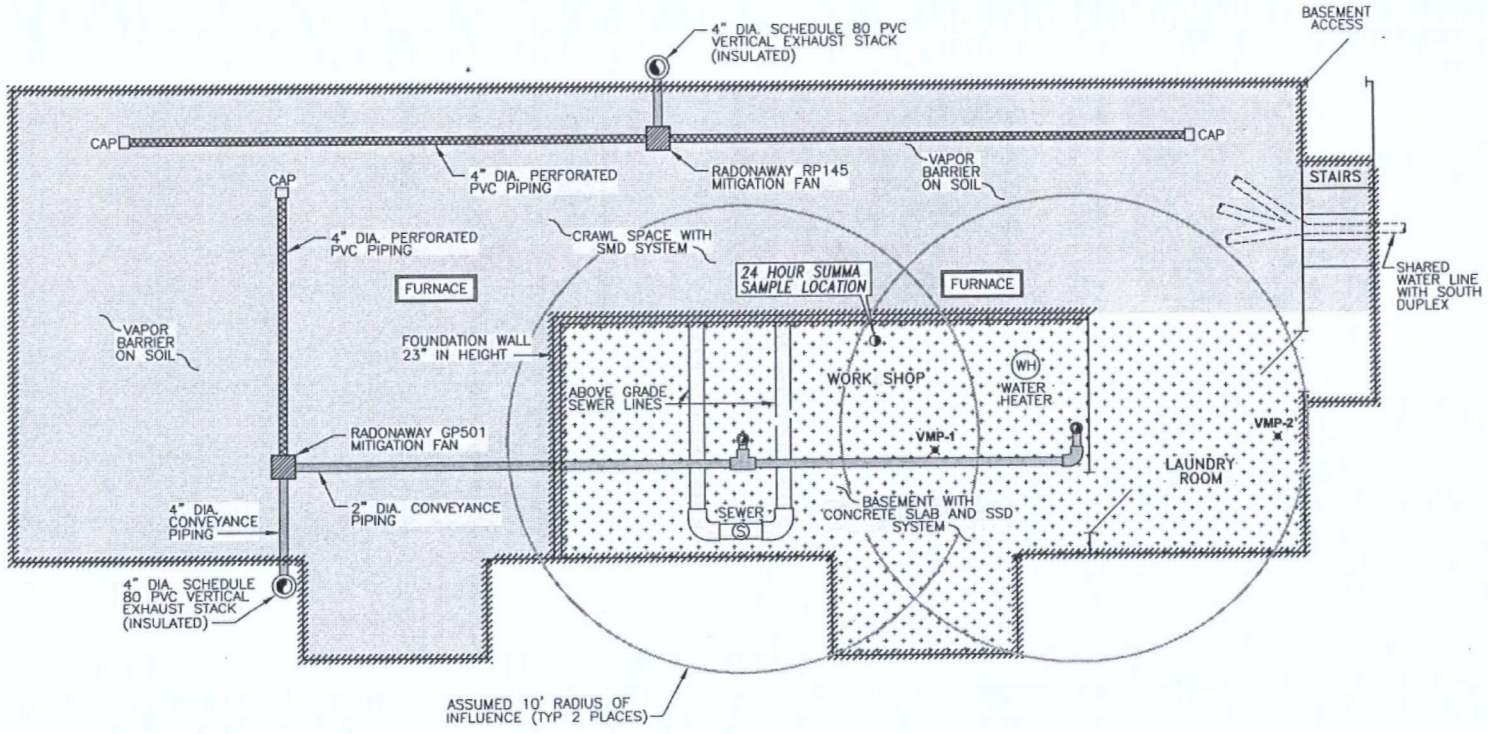
Contaminant	Cleanup Level ($\mu g/m^3$)
PCE	42
TCE	2.0
cDCE	7.3
tDCE	63
1,1-DCE	210
VC	1.6

Key: $\mu g/m^3$ = micrograms per cubic meter

For More Information

For more information or questions regarding vapor intrusion or the maintenance and repair of vapor intrusion systems contact the Alaska Department of Environmental Conservation

Department of Environmental Conservation
Division of Spill Prevention and Response
Contaminated Sites Program
555 Cordova Street
Anchorage, AK 99501
(907) 269-7503



LEGEND

- VMP-1 — VAPOR MONITORING POINT LOCATION
- INDOOR AIR SAMPLE LOCATION
- 2" DIAMETER EXTRACTION WELL LOCATION
- VAPOR BARRIER ON SOIL
- RETRO-COAT APPLICATION AREA
- FOUNDATION WALLS WHERE RETRO-COAT WAS APPLIED
- PERFORATED PVC PIPE
- CONVEYANCE PIPE

N

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APPROX. SCALE IN FEET

FIGURE 5

736 E. 3rd AVENUE (NORTH DUPLEX)
AS-BUILT

VAPOR INTRUSION MITIGATION INSTALLATION REPORT
EPA EMERGENCY AND RAPID RESPONSE SERVICES
4TH AND GAMBELL SITE
Anchorage, Alaska

Ahtna Engineering

DATE: JANUARY 2015
REV.: –
CHKD: N.P.O.
DRAWN: C.E.H.
PROJ. No.: 15-001

PATH: D:\Project Drawings\2014 Drawings\14 Gambell\14 GAM VIM RPT FILE: 14-GAM-VIM-RPT-F5.DWG PLOTTED: 1/12/15.

FOURTH AND GAMBELL SITE

VAPOR MITIGATION SYSTEM MONITORING, MAINTENANCE, AND REPAIR PLAN

736 EAST THIRD AVENUE – SOUTH DUPLEX

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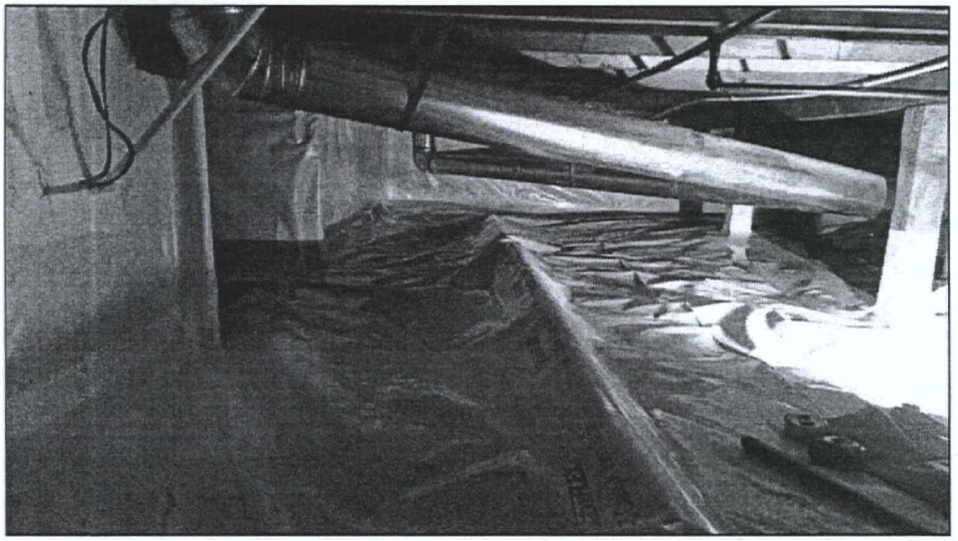
SOUTH DUPLEX VAPOR MITIGATION SYSTEM

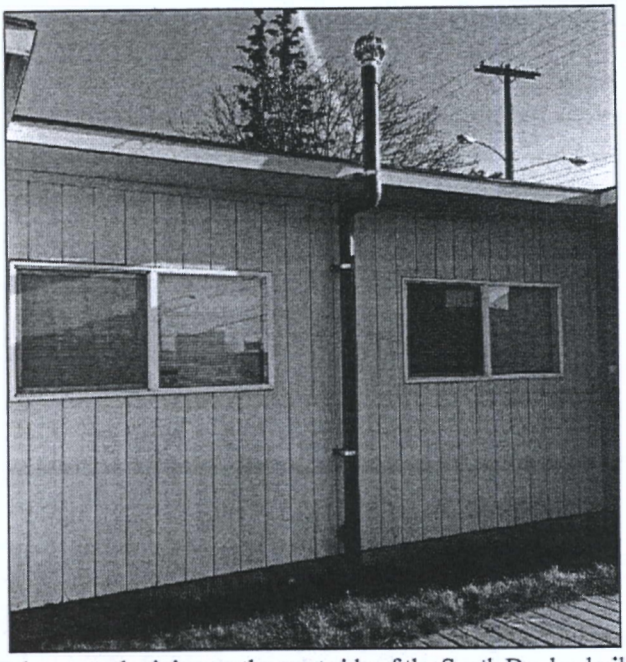
The vapor intrusion mitigation system in the South Duplex is a passive system consisting of two lines of perforated vent piping (sub-membrane depressurization lines) installed beneath a vapor barrier in the building's crawlspace. A diagram of the system layout is shown at the end of this plan.

The vapor barrier is secured to the concrete walls of the crawlspace using a vapor barrier tape and plastic anchor plugs to seal the structure off from the contaminant vapors in the soil. The sub-membrane depressurization lines are constructed of 4-inch diameter perforated PVC piping. The perforated piping was installed beneath the vapor barrier to vent off volatile contaminants that build up beneath the barrier as shown in Photograph 1.



Photograph 1: Plastic vapor barrier encapsulating perforated ventilation piping.

The two lines of perforated piping are located on the west and east sides of the building, extending north to south through the crawlspace. The perforated lines are connected to 4-inch diameter PVC conveyance piping that extends to exterior exhaust stacks on the west and east sides of the structure. Passive wind-driven ventilation fans were installed on top of the exhaust stacks to draw the contaminant vapors out of the building as shown in Photograph 2.



Photograph 2: Exhaust stack piping on the west side of the South Duplex building.

Quarterly Inspection

The system should be inspected quarterly by the property owner/facility manager (or environmental contractor) for indications of damage to the vapor barriers, the indoor piping or exhaust stacks. The quarterly monitoring tasks include:

- Inspection of the vapor barrier for tears or holes.
- Inspect for indications that the barrier is peeling away from the concrete perimeter walls.
- Inspection of the vapor barrier for puddles that could form on top of the liner material from leaks in the building's water or drain piping. Standing water can breakdown the vapor barrier tape along the liner seams opening up an entry point for contaminant vapors into the building.
- Inspection of the exhaust stacks and ventilation fans on the exterior of the structure for any indications of damage. Verify that the ventilation fans are spinning during windy conditions. Note any growling or rattling noise coming from wind turbine.

If any damage to the vapor barriers, the indoor piping, or the exhaust stacks are observed during the quarterly inspection, an environmental contractor should be contracted to make needed repairs to ensure the long-term protectiveness and durability of the vapor intrusion systems.

Biannual Maintenance

At the base of the exhaust stacks on each side of the building is a drain plug installed to drain condensate or precipitation that accumulates in the exhaust stack. The following biannual maintenance should be performed by the property owner/facility manager (or environmental contractor) to maintain the system:

- Open the drain valves at the base of the exhaust stack twice a year in the spring and fall during non-freezing conditions to remove any condensation or precipitation from the exhaust piping.

Care

The property owner/facility manager must avoid disturbance to the vapor barrier liners, the indoor piping, and the exhaust stacks. In particular, the property owner/facility manager must:

- Avoid placing heavy and/or sharp objects on the liner.
- Repair all water and drain line leaks in a timely manner, removing any standing water.
- Avoid accessing the crawlspace with the exception of system monitoring events and/or repairs.

Sampling Every Two Years

It is recommended that indoor air sampling for contaminants of concern be performed every two years by an environmental contractor to ensure continued successful operation of the vapor intrusion mitigation system.

The following sampling and analysis plan should be provided to an environmental contractor to ensure the collection of representative indoor air samples.

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Sample Locations

The indoor air sample should be collected from the crawl space of the building in a centrally located area that has minimal influence from features with increased

air exchange (e.g., near an exterior door or window). The sample should be collected from the location shown on the attached figure (between the furnaces).

Sample Collection

The following actions should be performed prior to sampling:

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VC	1.6

Key:
$\mu g/m^3$ = micrograms per cubic meter

For More Information

For more information or questions regarding vapor intrusion or the maintenance and repair of vapor intrusion systems contact the Alaska Department of Environmental Conservation, Division of Spill Prevention and Response, Contaminated Sites Program.

Department of Environmental Conservation
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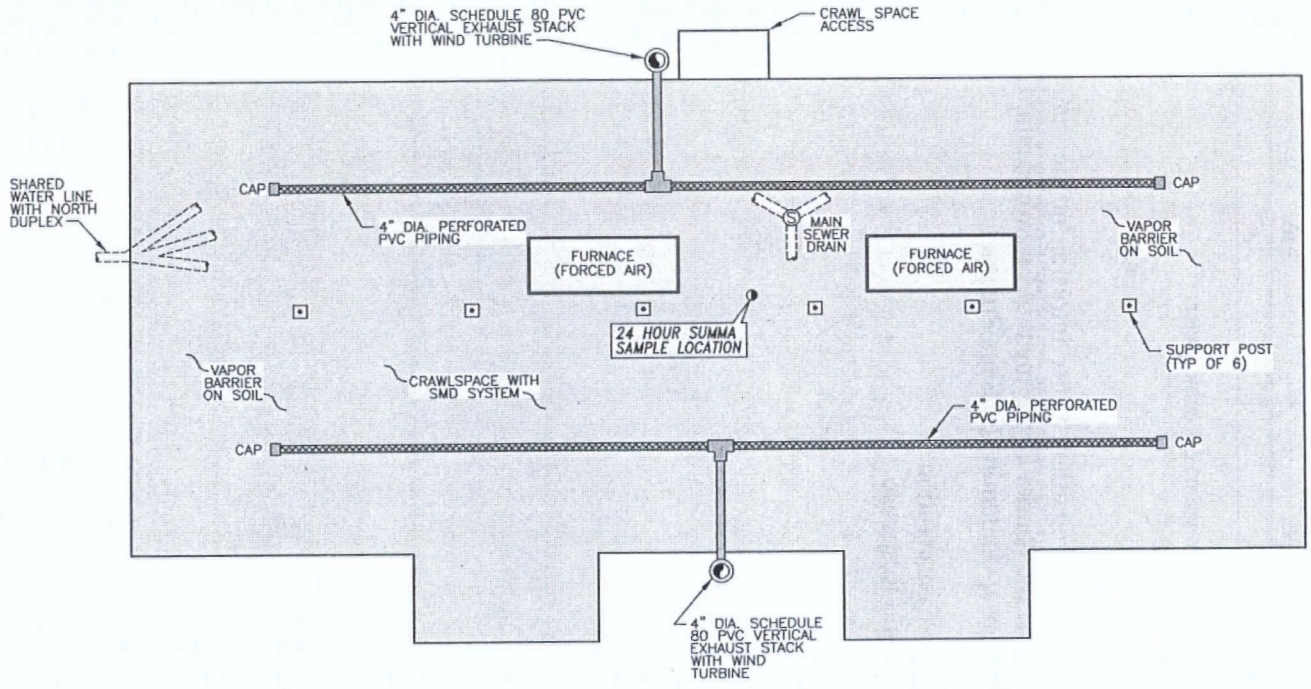

LEGEND

- INDOOR AIR SAMPLE LOCATION
- VAPOR BARRIER ON SOIL
- RETRO-COAT APPLICATION AREA
- FOUNDATION WALLS WHERE RETRO-COAT WILL BE APPLIED
- PERFORATED PVC PIPE
- CONVEYANCE PIPE

NOTE:
VAPOR BARRIER EXTENDS TO TOP OF FOUNDATION WALLS AROUND BUILDING PERIMETER.

N

0 2.5 5

APPROX. SCALE IN FEET

736 E. 3rd AVENUE (SOUTH DUPLEX) AS-BUILT

VAPOR INTRUSION MITIGATION INSTALLATION REPORT
EPA EMERGENCY AND RAPID RESPONSE SERVICES
4TH AND GAMBELL SITE
Anchorage, Alaska

FIGURE 6

Ahtna Engineering

DATE: JANUARY 2015
REV.: -
CHKD: N.P.O.
DRAWN: C.E.H.
PROJ. No.: 15-001

PATH: D:\Project Drawings\2014 Drawings\14 Gambell\14 GAM VIM RPT FILE: 14-GAM-VIM-RPT-FE.DWG PLOTTED: 1/12/15.